

CLAIMS

1. A sprinkler, comprising:

2 an outer housing having a lower end connectable to a source of pressurized water;
4 a riser vertically reciprocable along a vertical axis within the outer housing between extended
6 and retracted positions when the source of pressurized water is turned ON and OFF;
8 a nozzle mounted at an upper end of the riser for rotation about the vertical axis;
10 a turbine mounted for rotation inside the riser; and
12 a drive mechanism mounted within the riser and connecting the turbine to the nozzle so that
14 when the source of pressurized water is turned ON the resulting rotation of the turbine by the
16 pressurized water will rotate the nozzle, the drive mechanism including a reversing mechanism for
causing the nozzle to rotate between a pair of arc limits, the reversing mechanism including a common
rotatable driving member drivingly connected to the turbine through a gear train reduction, the
driving member being capable of driving a pair of spaced apart driven members in opposite rotational
directions, a sliding clutch positioned between the upper and lower driven members and reciprocable
along a central drive shaft but rotatably coupled thereto, and a clutch moving member for
reciprocating the clutch along the drive shaft to selectively positively engage the clutch with one or
the other of the driven members.

2. The sprinkler of Claim 1 and further comprising a mechanism that allows a least one

2 of the arc limits to be adjusted.

3. The sprinkler of Claim 1 and further comprising an over-center mechanism for shifting

2 the reversing mechanism.

4. The sprinkler of Claim 3 wherein the clutch reciprocating member is a yoke linked to

2 the over-center mechanism.

5. The sprinkler of Claim 1 wherein the clutch has radially extending teeth formed on
2 upper and lower sides thereof that selectively engage with radially extending teeth on opposing sides
of the driven members.

6. The sprinkler of Claim 1 wherein the common rotatable driving member comprises a
2 central bevel pinion gear.

7. The sprinkler of Claim 6 wherein the driven members are each comprise a bevel gear
2 that meshes with the central bevel pinion gear.

8. The sprinkler of Claim 1 wherein the clutch is splined to the drive shaft.

9. The sprinkler of Claim 1 wherein the nozzle is mounted in a turret and a turret
2 coupling assembly connects an end of the drive shaft to the turret.

10. The sprinkler of Claim 7 wherein the one of the upper and lower bevel gears that is
not engaged by the clutch is free to rotate about the drive shaft in a direction opposite to a direction
of rotation of the drive shaft.

11. A sprinkler, comprising:

an outer housing having a lower end connectable to a source of pressurized water;
a riser vertically reciprocable along a vertical axis within the outer housing between extended
4 and retracted positions when the source of pressurized water is turned ON and OFF;
a nozzle mounted at an upper end of the riser for rotation about the vertical axis;
6 a turbine mounted for rotation inside the riser; and
a drive mechanism mounted within the riser and connecting the turbine to the nozzle so that
8 when the source of pressurized water is turned ON the resulting rotation of the turbine by the
pressurized water will rotate the nozzle, the drive mechanism including a reversing mechanism for
10 causing the nozzle to rotate between a pair of arc limits, the reversing mechanism including a central

bevel pinion gear drivingly connected to the turbine through a gear train reduction, the central bevel
12 pinion gear being capable of driving a pair of spaced apart upper and lower bevel gears in opposite
rotational directions, a sliding clutch positioned between the upper and lower bevel gears and
14 vertically reciprocable along a central drive shaft but rotatably coupled thereto, and means for
vertically reciprocating the clutch along the drive shaft to selectively positively engage the clutch with
16 one or the other of the upper and lower bevel gears.

12. The sprinkler of Claim 11 and further comprising a mechanism that allows at least one
2 of the arc limits to be adjusted.

□ 2 13. The sprinkler of Claim 11 and further comprising an over-center mechanism for
shifting the reversing mechanism.

□ 2 14. The sprinkler of Claim 13 wherein the clutch reciprocating means includes a yoke
vertically movable by the over-center mechanism.

□ 2 15. The sprinkler of Claim 11 wherein the clutch has radially extending teeth formed on
upper and lower sides thereof that selectively engage with radially extending teeth on opposing sides
of the upper and lower bevel gears.

16. The sprinkler of Claim 11 wherein the turbine rotates about a horizontal axis and the
2 gear train reduction includes a plurality of gears that rotate about a plurality of corresponding
horizontal axes.

17. The sprinkler of Claim 11 wherein the clutch is splined to the drive shaft.

18. The sprinkler of Claim 11 wherein the nozzle is mounted in a turret and a turret
2 coupling assembly connects an end of the drive shaft to the turret.

19. The sprinkler of Claim 11 wherein the one of the upper and lower bevel gears that is
2 not engaged by the clutch is free to rotate about the drive shaft in a direction opposite to a direction
of rotation of the drive shaft.

20. A sprinkler, comprising:
2 an outer housing having a lower end connectable to a source of pressurized water;
4 a riser vertically reciprocable along a vertical axis within the outer housing between extended
and retracted positions when the source of pressurized water is turned ON and OFF;
6 a nozzle mounted in a turret positioned at an upper end of the riser for rotation about the
vertical axis;
8 a turbine mounted for rotation about a horizontal axis inside the riser;
10 a drive mechanism mounted within the riser and connecting the turbine to the nozzle so that
when the source of pressurized water is turned ON the resulting rotation of the turbine by the
pressurized water will rotate the nozzle, the drive mechanism including a reversing mechanism for
causing the nozzle to rotate between a pair of arc limits, the reversing mechanism including a central
12 bevel pinion gear drivingly connected to the turbine through a gear train reduction, the gear train
reduction including a plurality of gears that rotate about a plurality of corresponding horizontal axes,
the central bevel pinion gear being capable of driving a pair of spaced apart upper and lower bevel
14 gears in opposite rotational directions, a sliding clutch positioned between the upper and lower bevel
gears and vertically reciprocable along a central drive shaft and splined to the drive shaft, and a yoke
16 capable having a first end coupled to the clutch for vertically reciprocating the clutch along the drive
shaft to selectively positively engage the clutch with one or the other of the upper and lower bevel
gears, the clutch having radially extending teeth formed on upper and lower sides thereof that
20 selectively engage with radially extending teeth on opposing sides of the upper and lower bevel gears,
the one of the upper and lower bevel gears that is not engaged by the clutch being free to rotate about
22 the drive shaft in a direction opposite to a direction of rotation of the drive shaft;
24 a turret coupling assembly connecting an upper end of the drive shaft to the turret;
an over-center mechanism connected to a second end of the yoke for shifting the reversing
mechanism; and

26 a mechanism that allows at least one of the arc limits to be adjusted.

21. A reversing mechanism for connecting a turbine in a sprinkler to a rotatable nozzle,
2 comprising:

4 a drive shaft;

6 a pair of spaced apart driven members mounted on the drive shaft;

8 a common rotatable driving member drivingly connectable to a turbine, the driving member
capable of engaging the pair of spaced apart driven members so that rotation of the driving member
will rotate the driven members in opposite rotational directions around the drive shaft,

10 a sliding clutch mounted on the drive shaft between the upper and lower driven members and
reciprocable along the drive shaft but rotatably coupled thereto; and

12 a clutch moving member having one end engaged with the clutch for reciprocating the clutch
along the drive shaft to selectively positively engage the clutch with one or the other of the driven
members.

22. The reversing mechanism of Claim 21 wherein the clutch has radially extending teeth
formed on upper and lower sides thereof that selectively engage with radially extending teeth on
opposing sides of the driven members.

23. The reversing mechanism of Claim 21 wherein the common rotatable driving member
comprises a central bevel pinion gear.

24. The reversing mechanism of Claim 23 wherein the driven members are each comprise
a bevel gear that meshes with the central bevel pinion gear.

25. The reversing mechanism of Claim 24 wherein the clutch is splined to the drive shaft.